Amendments to the Claims

1. (CURRENTLY AMENDED) A vertical power transistor trench-gate semiconductor device ~~(100)~~ having a trench network ~~(STR1, ITR1)~~ extending into a semiconductor body ~~(10)~~ and surrounding a plurality of closed transistor cells ~~(TCS),~~ wherein the trench network comprises segment trench regions ~~(STR1)~~ adjacent sides of the transistor cells ~~(TCS)~~ and intersection trench regions ~~(ITR1)~~ adjacent corners of the transistor cells, wherein each transistor cell ~~(TCS)~~ has a source region ~~(24)~~ and a drain region ~~(12)~~ which are vertically separated by a channel-accommodating body region ~~(23)~~ adjacent a segment trench region ~~(STR1)~~ at each side of the transistor cell, and wherein each segment trench region contains gate material ~~(22)~~ separated from the semiconductor body ~~(10)~~ by insulating material ~~(21)~~ at the vertical sides and at the bottom of the segment trench region ~~(STR1),~~ wherein the intersection trench regions ~~(ITR1)~~ each include insulating material ~~(21C, 21D)~~ which extends from the bottom of the intersection trench region with a thickness which is greater than the thickness of the insulating material ~~(21B1)~~ at the bottom of the segment trench regions ~~(STR1)~~, gate material ~~(22)~~ being provided above the insulating material ~~(21C, 21D)~~ in the intersection trench regions ~~(ITR1)~~ and bridging the gate material ~~(22)~~ in the segment trench regions ~~(STR1)~~, wherein the greater thickness of the insulating material ~~(21C, 21D)~~ extending from the bottom of the intersection trench regions ~~(ITR1)~~ is effective to increase the drain-source reverse breakdown voltage of the device ~~(100)~~.

2. (CURRENTLY AMENDED) A device as claimed in claim 1, wherein the insulating material ~~(21B1')~~ is thicker at the bottom of the trench segment regions ~~(STR1)~~ than at the vertical sides ~~(21A1)~~ of the trench segment regions so as to reduce the gate-drain capacitance of the device ~~(100),~~ and wherein the greater thickness of insulating material ~~(21C')~~ extending from the bottom of the intersection trench regions ~~(ITR1)~~ further reduces the gate-drain capacitance of the device.

3. (CURRENTLY AMENDED) A device as claimed in ~~claim 1 or claim 2~~claim 1, wherein the closed transistor cells ~~(TCS)~~ are each rectangular shaped with a said segment trench region ~~(STR1)~~ adjacent each one of four sides of the cell.

4. (CURRENTLY AMENDED) A device as claimed in claim 3, wherein the closed transistor cells ~~(TCS)~~ are square shaped.

5. (CURRENTLY AMENDED) A device as claimed in ~~claim 3 or claim 4,~~claim 3 wherein each intersection trench region ~~(ITR1)~~ has a square shaped area.

6. (CURRENTLY AMENDED) A device as claimed in ~~claim 3 or claim 4~~claim 3, wherein each intersection region ~~(ITR5)~~ has a cruciform shaped area.

7. (CURRENTLY AMENDED) A device as claimed in ~~claim 1 or claim 2~~claim 1, wherein the closed transistor cells ~~(TCH)~~ are each hexagonal shaped with a said segment trench region ~~(STR2)~~ adjacent each one of six sides of the cell ~~(TCH)~~.

8. (CURRENTLY AMENDED) A device as claimed in ~~any preceding claim~~claim 1, wherein at least that part of the insulating material ~~(21C)~~ which extends from the bottom of each intersection trench region ~~(ITR1)~~ nearest the corners of the adjacent transistor cells ~~(TCS)~~ extends upwards ~~(21A4)~~ to thicken the insulating material at least at these corners over at least part of the vertical extent of the channel-accommodating body region ~~(23)~~ so as to increase the threshold voltage of the device.

9. (CURRENTLY AMENDED) A device as claimed in claim 8, wherein the insulating material ~~(21C)~~ in each intersection trench region ~~(ITR1)~~ which is thickened over at least part of the vertical extent of the channel-accommodating region ~~(23)~~ is so thickened ~~(21A4)~~ only at a peripheral part of the area of intersection trench region ~~(ITR1)~~.

10. (CURRENTLY AMENDED) A device as claimed in claim 8, wherein the insulating material ~~(21D)~~ which extends from the bottom of each intersection trench region ~~(ITR1)~~ has the same thickness over the whole area of the intersection trench region.

11. (CURRENTLY AMENDED) A device as claimed in ~~any preceding claim~~claim 1, wherein the semiconductor body ~~(10)~~ is silicon and wherein the insulating material at the bottom ~~(21B1)~~ of the segment trench regions ~~(STR1)~~ and the insulating material extending from the bottom ~~(21C, 21D)~~ of the intersection trench regions ~~(ITR1)~~ is silicon dioxide.

12. (CURRENTLY AMENDED) A method of making a device as claimed in ~~any preceding claim~~claim 1, the method including

a first sequence of steps ~~(Figures 20-25, 30)~~ at the conclusion of which there are provided trenches for the intersection trench regions ~~(ITR1)~~ with the insulating material ~~(32,~~

~~32B)~~ which extends from the bottom of the intersection trench regions, and in which there are provided empty trenches ~~(TR1, TR2)~~ for the segment trench regions ~~(STR1)~~, and

a second sequence of steps ~~(Figure 26)~~ at the conclusion of which there is provided the insulating material at the vertical sides ~~(21A1)~~ and bottom ~~(21B1)~~ of the segment trench regions ~~(STR1)~~, and also there is provided the gate material ~~(22)~~ in the segment trench regions and above the insulating material ~~(32)~~ in the intersection trench regions.

13. (CURRENTLY AMENDED) A method as claimed in claim 12, wherein the first sequence of steps includes

etching a first set of parallel trenches ~~(TR1)~~ in areas to be occupied by some of the segment trench regions ~~(STR1)~~ and in areas to be occupied by the intersection trench regions ~~(ITR1),~~

providing the insulating material ~~(32)~~ which will extend from bottom of the intersection trench regions in the final device within and along the whole length of the first set of trenches ~~(TR1),~~

etching a second set of trenches ~~(TR2)~~ in areas to be occupied by the remainder of the segment trench regions ~~(STR1),~~

providing a different insulating material ~~(33)~~ to fill the second set of trenches ~~(TR2)~~ and to cover the insulating material ~~(32)~~ in the intersection trench regions ~~(ITR1),~~

removing the insulating material ~~(32)~~ from the segment trench regions ~~(STR1)~~ of the first set of trenches ~~(TR1),~~ and then removing the different insulating material ~~(33).~~